

Outlook remains strong for
75-year-old Fischer-Tropsch
technology Page 27

JULY 23, 1990

CHEMICAL & ENGINEERING

NEWS



Polymer Composites

Aerospace markets continue to
drive growth of advanced materials

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News of the Week

■ Science-related federal agencies could suffer catastrophic cuts if Congress allows budget-deficit dictated, Gramm-Rudman-Hollings cuts in federal spending to take place. **Page 4**

■ At International Chemistry Olympiad in Paris, U.S. team made its best showing ever, won one gold and three silver medals to place fourth. **Page 4**

■ National Research Council report criticizes U.S. programs for storing high-level radioactive waste. **Page 5**

■ Next week NIH's DNA Advisory Committee is expected to approve first clinical trials of human gene therapy. **Page 5**

■ Voluntary retirement is offered to hundreds of employees by Schering-Plough and Hoechst Celanese. **Page 6**

■ ICI is reorganizing its specialty chemicals into one cohesive unit, ICI Specialties, in a move to accelerate their growth. **Page 6**

Cover: Air Force's B-2 stealth bomber.
Photo courtesy of Northrop Corp.

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Business

Canada's constitutional crisis over Quebec's relationship with rest of country has chemical firms concerned. **Page 13**

Government

House-Senate conference committee has begun work on clean air legislation, faces some time-consuming debate; use of U.S. science information resources lacks federal leadership; progress, plans in cleaning up hazardous waste are assessed by EPA. **Page 17**

Science/Technology

Fischer-Tropsch technology is poised to play new role in energy future of U.S. as fuels and chemicals production shift from a petroleum base; UCLA's Richard B. Bernstein dies. **Page 27**

Education

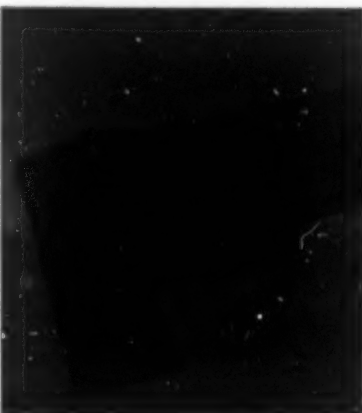
Ceremony marking new Dow Chemical education initiative underscores company's commitment to education. **Page 34**

Books

Missed chances for accidental scientific discovery, procedures for lab waste removal are topics of book reviews. **Page 61**

ACS News

Council faces two petitions, other business at next month's meeting in Washington, D.C. **Page 67**



Product Report

Thermoset and thermoplastic resins and carbon, glass, and organic polymer fibers combine to make the advanced polymer composites vital to contemporary aerospace needs. **Page 37**

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LETTERS

CHEMICAL SAFETY

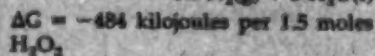
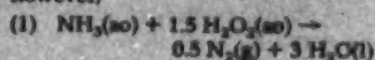
Mixtures of sulfuric acid and hydrogen peroxide

Relative to the letter by Robert G. Bergman and his associates on the explosions of mixtures of sulfuric acid and hydrogen peroxide (C&EN, April 23, page 2), I would like to report the following thoughts and observations.

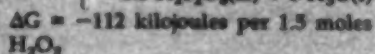
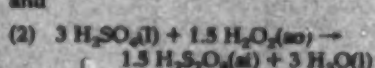
The Berkeley explosion reminded me of an explosion the results of which I observed in the late 1950s. At that time we had found that a mixture of ammonium hydroxide and hydrogen peroxide was extremely effective in cleaning silicon surfaces. A junior chemist in the transistor pilot line laboratory mixed a batch of this reagent in a 5-gal glass container and stoppered it in violation of my instructions to mix only small batches and never have it in a closed container. The reagent exploded, driving shards of glass into a wall at the opposite side of the laboratory (about 60 feet away). Fortunately, no one was in the laboratory at the time of the explosion.

One of the methods of synthesizing peroxydisulfuric acid is to oxidize sulfuric acid with hydrogen peroxide. The hydrolysis product of peroxydi-

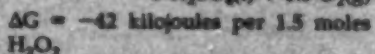
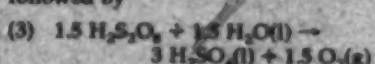
sulfuric acid is the notorious Caro's acid. It might appear that the ammonium hydroxide and sulfuric acid reactions are very different. Consider, however,



and



followed by



While there is a significant difference between -484 and -154, an exergonicity of 154 kilojoules is not trivial.

Sheldon L. Mathew

Chairman of the Board/CEO

Nace Technology Inc.

San Jose, Calif.

Financial rewards

That many of us in the chemistry profession are quite concerned with the decline in bright students entering the field is certainly an understatement. I have, however, been waiting among all the letters on this topic for an additional important point to be brought out that I believe has a tremendous impact on the whole issue. This issue is certainly multifaceted, but to me, it is self-evident that you get what you pay for, and industry at current does not pay high salaries for good chemists. The really top compensation goes only to the managers.

I do not wish to take anything away from managers, but I assume that most of us who entered chemistry did so because we love doing just that—chemistry. If we had wanted to be managers, we should have gone into business administration, a path with considerably less investment in time and money to reach the final goal. I, incidentally, do not agree with the assessment of Joel T. Mague (C&EN, April 16, page 55) that those of us expecting extra compensation for extra effort are lazy and greedy.

Rather, I feel it is a sad state of affairs when making a choice to remain close to chemistry means finding that it has all but eliminated chances for top financial reward (and also recognition) in an industrial research setting.

But yet, if we choose to distance ourselves from chemistry, the compensation package begins now to be quite lucrative. It is, I believe, hard for most of us to get excited about doing good research only to see someone else reap the rewards for our work. It is my opinion that until such a problem is addressed and rectified by actually paying chemists to be good at doing chemistry, instead of doing management functions for which chemists seem to be poorly trained in general, that we will have trouble attracting the bright stars we all want to see.

I doubt, however, that most managers can be expected to voluntarily pay their good people more to stay at the bench than they themselves are compensated. Normal people would be expected to have problems with such a state of affairs. Such a change will have to be

Chemical Firms Wait Out Canada's Constitutional Crisis Over Quebec

Uncertainty of relationship of Quebec, key part of chemical industry, with rest of nation presents tough questions for Canadian, U.S. companies

For the Canadian chemical industry, and for U.S. chemical companies doing business in Canada, it is "business as usual" while federal and provincial politicians figure out where to steer the country now that the Meech Lake constitutional accord has been scrapped.

The Meech Lake accord, named after the lake near Ottawa where the agreement was hammered out in April 1987, would have granted the French-speaking province of Quebec "distinct society" status. To become effective, Canada's 10 provinces had to ratify the accord—unanimously—by the June 23 deadline. When Newfoundland and Manitoba failed to ratify the agreement, Meech Lake died and plunged Canada into a constitutional crisis.

The big question now, of course, is what kind of relationship there will be between Quebec and the rest of Canada. The possibilities range from remaining in the Canadian federation under the status quo, which is highly unlikely, to outright secession. In between are several other options, including "sovereignty association," an ill-defined term that no doubt would encompass some kind of loose economic, if not political, association.

The ball is in Quebec's court, where separatist sentiment never has been higher. However, Quebec's premier, Robert Bourassa, has set up a nonpartisan commission to study the possibilities and define Quebec's

new relationship with Canada by next March. The commission's recommendations could be followed by a referendum in Quebec.

Meanwhile, Canadian and U.S. chemical leaders are groping for answers to several important questions. What impact will the political uncertainty have on both domestic and foreign chemical investment—in Quebec and the rest of Canada? What will happen to interprovincial chemical trade between Quebec and the other Canadian provinces? What will happen to the Canada-U.S. free trade agreement, still only about 18 months old? How will any possible impact on the Canadian dollar trickle down into other nooks and crannies of the Canadian economy?

Until something specific happens in the political arena, business leaders can only speculate about the answers. And there's very little that Canadian chemical companies can do except "business as usual."

W. Norman Kissick, chairman and

chief executive officer of Union Carbide Canada, says that business executives have very little to go on as far as the near-term future is concerned. Carbide Canada, 75% owned by Union Carbide Corp. (Danbury, Conn.), has chemical operations in Quebec as well as in other Canadian provinces. Until Quebec comes up with an approach that is best from its perspective, adds Kissick, chemical companies will just have to ride out the uncertainty.

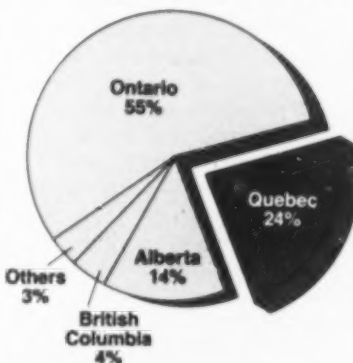
Andre Lapalme, president of Pétromont, agrees. He says the death of the Meech Lake accord has had no direct impact on the chemical industry "that you can measure." He is more concerned about the long-term stability of the market. Lapalme points out that, for Pétromont, the market is not just Canada, but the U.S. as well.

Lapalme concedes that, if political instability arising out of the Meech Lake situation continues for an inordinate length of time, there could be reason for concern about chemical investment in Quebec. However, he believes that, compared with the separatist movement in the early 1980s, Quebecers are taking a much more mature approach.

The petrochemical buildup in Alberta and the "chemical valley" of Sarnia, Ontario, notwithstanding, Quebec is a very important part of the Canadian chemical industry. Last year, the province accounted for \$4.7 billion worth of chemical shipments. That's a hefty 24% of the Canadian total.

Pétromont is the cornerstone of Quebec's petrochemical industry. The company, owned jointly by Union Carbide Canada and Ethylec Inc. (a wholly owned subsidiary of the Quebec government agency Le Groupe SGF), produces ethylene, propylene, and other chemicals at its

24% of Canada's chemical shipments begin in Quebec

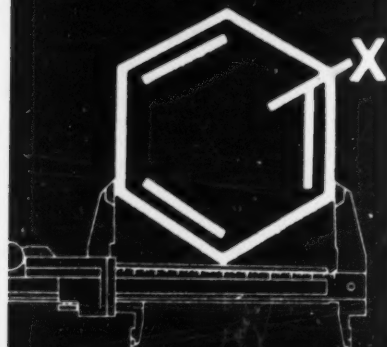


1989 chemical shipments = \$19.9 billion (U.S.)*

* At current exchange rates, \$1.00 U.S. = \$1.16 Canadian. Source: Statistics Canada

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Business

petrochemical complex in Varennes, across the St. Lawrence River from Montreal. It also has a long-term lease on an old, high-pressure, low-density polyethylene (LDPE) plant that Union Carbide Canada owns and operates for Pétromont at Montreal East.

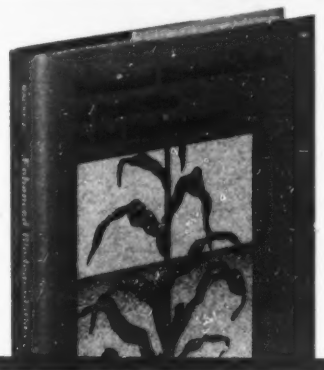
Pétromont, which suffered through some lean years in the early and mid-eighties, now has some ambitious expansion plans in the works. It is acquiring the old LDPE plant at Montreal East from Union Carbide Canada, will gradually phase out LDPE production, then shift to high-density polyethylene (HDPE). HDPE will be produced in a new, 200,000 metric-ton-per-year plant that Pétromont is building at Montreal East. Pétromont will market part of the plant's output in Canada, while Union Carbide will market the remainder in the U.S. and outside North America.

Meanwhile, Pétromont also is adding a sixth cracker to expand ethylene capacity at Varennes from 220,000 metric tons to 265,000 metric tons per year. The ethylene expansion is scheduled to be completed by the time the HDPE unit comes on stream in Montreal East—probably early next year. But for Pétromont and the rest of the petrochemical industry in the Montreal area, much is riding on the completion of the so-called Soligaz pipeline project to carry much-needed natural gas liquids from western Canada to Montreal. Soligaz is a consortium of companies that includes Pétromont.

The original plan of the long-delayed project was to build a pipeline from Sarnia, Ontario, to Montreal to carry natural gas liquids that Pétromont would use as feedstock for its olefins units. Now the consortium is considering an alternate plan. It is studying the possibility of using the existing Cochin pipeline and other lines through the U.S. and constructing a new pipeline from northern New York State to Montreal.

A lot of petrochemical investment has been riding on the outcome of the Soligaz pipeline. Over the long term, a lot now is riding on how the politicians shape the future of Quebec and Canada.

Earl Anderson



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It concludes with an appendix of key chemical structures.

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